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ABSTRACT

This document contains three papers from a symposium on using technology for learning that was conducted as part of a conference on human resource development (HRD). "Openness to Technology in Virtual Teams: Implications for International Human Resource Development" (Mary R. Watson, Leigh Anne Liu) reports on a study that examined the attitudes of 520 subjects in 6 countries toward technology and the use of technology in global virtual teams. "Towards a Framework for Teaching and Learning in an Online Environment: A Review of the Literature" (Sandra Wall Williams) addresses the lack of theory specifically related to teaching and learning in an online environment, presents two significant teaching and learning paradigms, and concludes that the integration of both approaches will allow for the emergence of new theories focusing on teaching and learning in online environments. "Learning Human Resource Development through Electronic Discussion" (Barbara J. Daley) reports on a study that examined the use of electronic discussion as a teaching and learning strategy for graduate students within an HRD graduate program. The study further indicated that learning progressed to a high analytical level during electronic discussion and that group process development also facilitated learning. The first and third papers contain substantial bibliographies. (MN)

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Using Technology for Learning

Symposium 1

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Openness to Technology in Virtual Teams: Implications for International Human Resource Development

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This study examines three levels of analysis--national culture, group identity, and individual --in the prediction of attitudes about and use of technology in global virtual teams. Using data from 520 subjects in six countries, we present validation results of an openness to technology scale, and examine a multi-level model of attitudes about technology. We find different predictors for individualist versus collectivist cultures, and we discuss implications for managing global virtual teams.

Keywords: Virtual Teams, International HRD, Technology

Fueled by a simultaneous explosion in new media technology to support cross-national communication and human resource development interventions, global corporate internet and intranet communications are commonplace (ACM, 1996; Hoffman, Kalsabeek, and Novak, 1996). Geographically dispersed virtual teams operate in most major multi-national corporate settings. Yet little is known about the cross-cultural communication differences among team members with different national culture backgrounds (Watson, Miguel, Aycan, and Jaeger, 1998; Gomez-Mejia and Palich, 1997). The purpose of our research is to validate an instrument designed to examine cultural differences in communication norms when virtual team members communicate via internet technology.

We begin by presenting a conceptual framework that links cross-cultural differences with communication theory. We then present the validation results of confirmatory factor analysis on an openness to technology scale developed earlier (Watson et. al, 1998). Next we turn to discussion of findings about attitudes about technology of more than 500 subjects in six nations. Then we explore the cultural generalizability of predictors related to our instrument. Finally, we discuss the implications of our results for human resource development in corporations using internet technology for global employee communication.

Theoretical Framework

Classic communication theory has a long history of examining how the communication medium impacts the way signals are sent, transmitted, and received. In recent years, a large body of empirical studies housed in the information systems literature has examined how communicating via electronic media impacts communication behavior (e.g., Jackson, Chow, and Leitch, 1997; Ferguson and Nevell, 1996). The channels studied range from the relatively simple and widely available electronic mail, through more complex and expensive media like simultaneous satellite live videoconferencing. In general, the array of contemporary electronic technology available is referred to as new media.

The process by which adoption of technology occurs has been studied at the industry, firm, group, and individual levels. We blend an institutional theory perspective (DiMaggio and Powell, 1983) with a social psychological attitudinal change perspective (Fishbein and Ajzen, 1975) and suggest that isomorphic effects occur that lead to the diffusion of perceived acceptability of technology across levels. Further, positive individual experiences with technology will lead to increased acceptance of technology. Thus, increased diffusion across both the macro and micro levels occur simultaneously.

The conceptual framework we examine is depicted in Figure 1. This model brings together concepts from multiple levels of analysis – the national culture level, the organization level, and the individual level.

Cultural Dimensions. In high uncertainty avoidance cultures, things that are unknown or different are perceived as dangerous, and innovation is resisted (Hofstede, 1991). In these cultures, uncertainty leads to stress and anxiety, and ambiguous situations are to be avoided. Conversely, those in low uncertainty avoidance cultures perceive new and different things as curious, and uncertainty is accepted.

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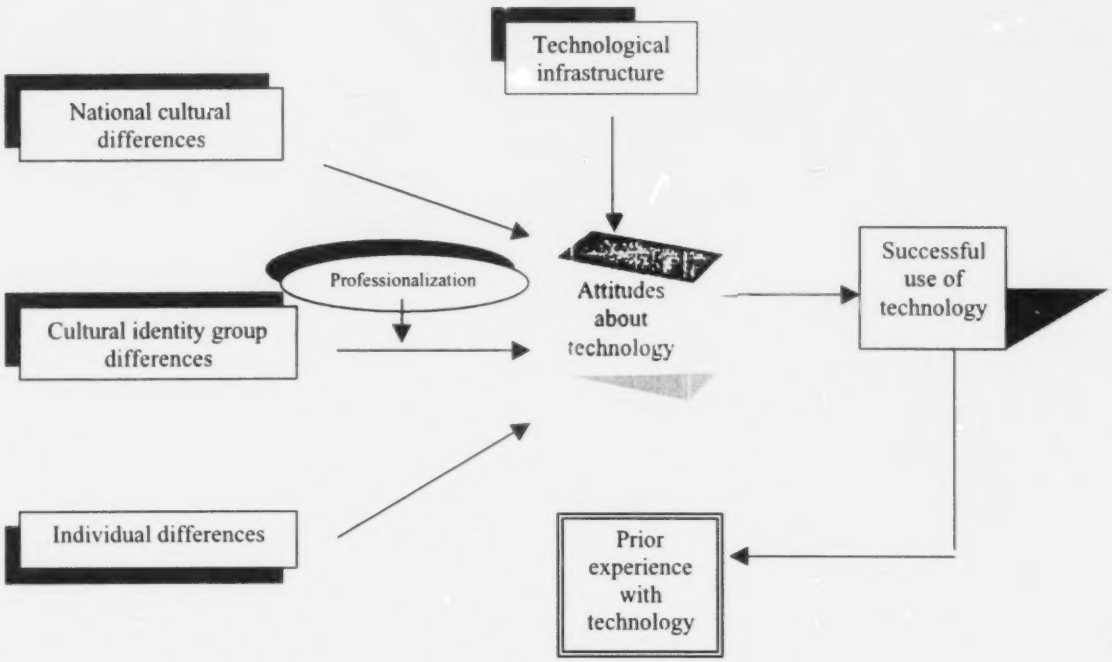
Hofstede (1980) and Gudykunst (1995) suggest that effective interpersonal and inter-group communication is a function of the amount of anxiety and uncertainty individuals experience when communicating with others. Gudykunst (1995) found that the ways individuals gather information to manage and reduce uncertainty differs in individualist and collectivist cultures. Members of individualist cultures seek out person-based information to reduce uncertainty about strangers, while people from collectivist cultures look for group-based information. When communicating with strangers, members of individualist cultures search for personal similarities while members of collectivist cultures are more likely to search for group similarities.

Figure 1: Multi-level Model of Predictors of Attitudes about Technology



According to Hall (1976), members of collectivist cultures emphasize the importance of context to explain others' behavior. Under uncertain situations, adapting and accommodating to the context is more important for members of collectivist cultures than to those of individualist cultures to manage the uncertainty. Using new media technology to communicate with people around the world brings more uncertainty to members of collectivist cultures since it is difficult to build groups and to access the physical communication context of others. With respect to the use of new technology, this leads us to the following hypotheses:

Hypothesis 1a: Those in low uncertainty avoidance cultures will be more open to the use of technology than those in high uncertainty avoidance cultures.

Hypothesis 1b: Those in individualist cultures will be more open to the use of technology than those in collectivist cultures.

Group/Organization Level Characteristics. Cultural identity groups are based on a wide variety of group-level characteristics: organization identity, cultural identification, professional norms, etc. Research on organizational culture (Schein, 1975), for example, finds that organizations vary from strong to weak cultures, and individuals within organizations tend to identify with organizational norms and with one another.

Yet there is debate about the homogeneity of organization members' attitudes. Joanne Martin's (1992) work divides culture into three perspectives: integration, differentiation, and fragmentation. Depending on the perspective taken, individuals in organizations are both similar in attitudes as well as different. The integration perspective, embraced implicitly by the person-organization fit literature (O'Reilly, Chatman, and Caldwell, 1991), suggests that consistency holds together organization members. The differentiation perspective allows for inconsistency across organizations, with subculture similarities (e.g., VanMaanen and Barley, 1985). Finally, the fragmentation perspective embraces a loosely coupled web of fluid and multiple meanings, with fluid identities adapting continuously as needs change (a perspective embraced by Weick, 1976).

Nonetheless, there is evidence that group identity differences do exist, and that across formal organizations attitudes are likely to be different. These cross organization differences are likely to be moderated by norms of subgroups, like professional norms. This leads to the following hypothesis about groups and new media technology:

Hypothesis 2: Across organizations, attitudes about technology will differ, and the extent to which they differ will vary depending on the strength of professionalism moderating the organizational differences.

Individual Differences. Individuals differ in both surface-level and deep-level dimensions (Harrison, Price, and Bell, 1998). Research on relational demography has investigated how surface level characteristics, like race and ethnicity, impact individual behavior (e.g., O'Reilly et. al, 1991). Deep level differences, like attitudes and values, have also been widely investigated. Attitudes and values have been linked to prior experiences with phenomena.

One key demography characteristic extensively investigated in the technology adoption literature is gender. Numerous empirical studies have examined the relationship between gender and attitudes about technology. In general, men have been found to be less anxious about technology and more likely to use it (e.g., Gefen and Straub, 1997; Gattiker and Hlavka, 1992). This leads to the following hypothesis about gender and new media:

Hypothesis 3: Men, as compared to women, will hold more positive attitudes about technology.

As with all multi-level phenomena, cross level interactions will exist across levels. We posit that all predictors may not be uniformly relevant across cultural settings. This leads to the following hypothesis:

Hypothesis 4: There will be an interaction effect between national cultural and group and individual dimensions, reflected by differing predictors of attitudes about technology depending on cultural type.

Methodology

Research Participants. The findings presented here are based on two sets of data collected from an internet-based discussion forum that linked more than 500 undergraduate and graduate students at seven universities in six countries (Canada, Israel, Turkey, Thailand, United States, The Netherlands). Participants took part in the internet based project as part of their course requirements.

First, the research team developed an instrument to measure attitudes about using computer technology (Watson et. al, 1998). Next, we collected data from 520 participants working in geographically dispersed virtual teams. We measured their attitudes about technology before and after a seven-week project (change in attitude data not shown here) in which they were required to participate in global teams. The results from our analyses support the validity of our technology attitudes instrument. Furthermore, they provide insight into how the cross-cultural differences of geographically dispersed team members impact their attitudes and satisfaction with internet technology.

Openness to Technology Scale. We validated a 40-item scale developed by Watson and colleagues (1998), designed to capture cognitive (e.g., I know what a LAN is), affective (e.g., Getting error messages makes me anxious), and behavioral components (e.g., I word process regularly). Cronbach's alpha for the 40-item scale was a very acceptable .86 overall.

As part of a prior research project, exploratory factor analysis was conducted using principal components extraction. Three factors emerged in our analyses: comfort with computers, technical knowledge about computers, and perceived value of computers (variance explained = 41.35%). All the sub-scales demonstrated high internal validity (Cronbach's alpha ranged from .65 to .93). Sample items from each factor appear in Table 1.

We validated this scale through confirmatory factor analysis on a separate data collection of 320 virtual team participants. Both sets of analyses support the validity of the openness to technology scale, specifically the replication of the three factors (comfort/experience, knowledge, and perceived value).

Table 1. Sample Items and Factor Loading for Three Factors

Factor 1: Comfort/Experience	Factor 2: Computer Knowledge	Factor 3: Perceived Value of Computers
Computers make me uncomfortable because I don't understand them (-.687) I'm good at finding information on the Internet (.672) I enjoy using computers (.740) Being expected to do new things with computers makes me anxious (-.435) I use the Internet regularly (.652) I enjoy working with machines of all kinds (.541) Computers make learning fun (.545) I use word processing regularly (.524)	I regularly read computer magazines or other sources that describe new technology (.593) I know how to replace a hard drive on a PC (.625) I know how to write a computer program (.617) I know what a LAN is (.497) I know what LEOS means (.614)	Being able to use computer at work would significantly increase my job satisfaction (.444) Access to information technology growth improves one's quality of life (.550) Learning to use cross cultural forum will make it easier for me to get a job (.649) I believe one can develop friendship via email (.477) Learning to use the cross cultural forum will enhance my education (.580)

Note: Factor loadings appear in parentheses.

Results and Findings

Hypothesis 1a suggested that those in low uncertainty avoidance cultures would hold more positive attitudes about computers than those in high uncertainty avoidance cultures. In the first study, we grouped our respondents based on uncertainty avoidance scores reported by Hofstede (1991). Consistent with our hypothesis, respondents from the low uncertainty avoidance (Canada/US) group reported more openness to technology in both the pre- ($p<.001$) and post-tests ($p<.002$) than respondents from the high uncertainty avoidance (Turkey/Israel) group.

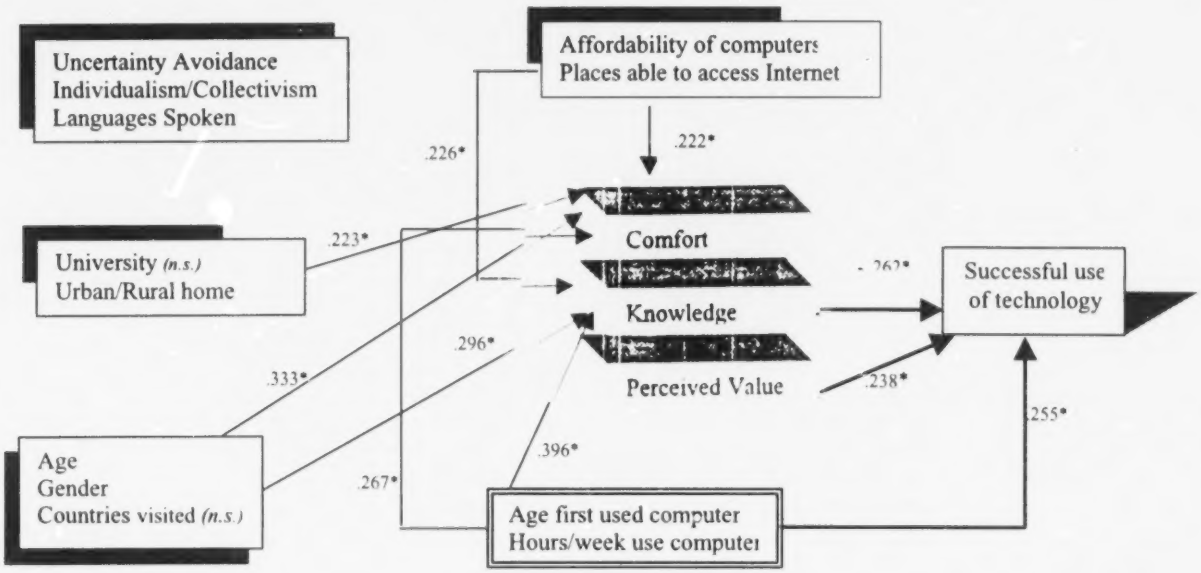
Hypothesis 1b suggested that those from individualist cultures would be more open to technology use than those from collectivist cultures. In the second study, we grouped respondents based on individualism and collectivism scores reported by Hofstede (1991). Consistent with our hypothesis, those from individualist cultures (US/Canada/Netherlands) reported more openness to technology than did those from collectivist cultures (Thailand/ Turkey).

Hypothesis 2 posited that across organizations, attitudes about computers would likely differ, but that those differences would be greater or lesser depending on the strength of professionalism. We ran analyses comparing the six universities on all technology subscales and detected no significant differences. We concluded that professional norms among universities were stronger than university identity differences, leading to a non-significant effect.

Hypothesis 3 suggested that men would have more positive attitudes about technology than women. Consistent with this proposition, we found that men reported more comfort with computers ($p<.01$) and more technical knowledge ($p<.002$) than women. Overall technology scale scores were also significantly higher for men than for women.

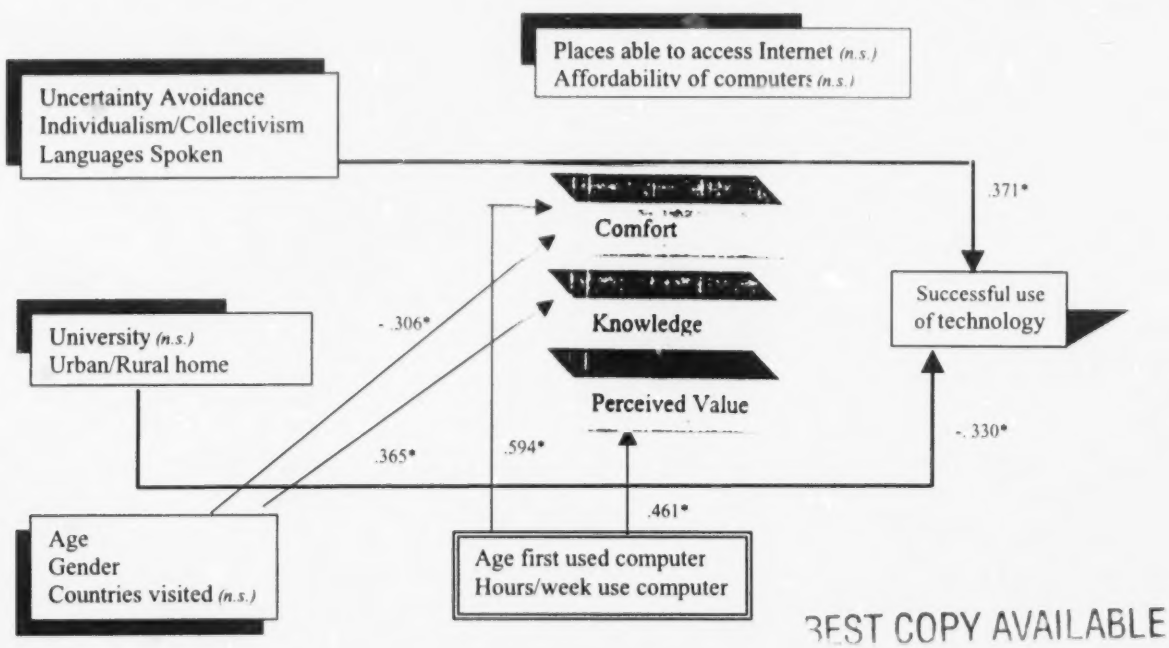
Hypothesis 4 posited that there would be different predictors across cultures for the successful use of technology. A Chow test on the differences between individualist and collectivist cultures resulted in significant scores ($F=2.3$ and $p<.05$). Figure 2 and Figure 3 depict the different predictors for individualist and collectivist cultures respectively.

Figure 2: Predictors in Individualist Cultures



*Note: Significant predictors are shown in lines and coefficients. * $p<.05$*

Figure 3: Predictors in Collectivist Cultures



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*Note: Significant predictors are shown in lines and coefficients. * $p<.05$*

Discussion

In the present study, we sought conceptual understanding and empirical testing of the multi-level model of predictors of attitudes about technology across cultures. We used our data in the aggregate to validate our attitudes about technology scale. Our results support all our hypotheses at the culture level (significant findings for uncertainty avoidance and individualism), group level (non-significant findings for university), and individual level (significant findings for age and gender).

We also posited that predictors for our model of attitudes and behavior would differ based on meta-culture type (e.g., Hofstede's individualism dimension), following existing theory in cross-cultural communication style differences (Hall, 1976; Hofstede, 1991). Consistent with our predictions, the results indicated that there are different predictors for attitudes about technology between individualist and collectivist cultures (see Figures 2 and 3). Because of space limitations, we highlight here only a few variables we explored.

Socioeconomic elements may explain some difference in the predictors of using technology because of the relatively higher level of industrialization and modernization of individualist cultures, versus the relatively lower levels in collectivist cultures. Although our data comes from only six countries, there is evidence that these relationships hold across the individualism/collectivism dimension. For example, Low (1996) argued that socioeconomic issues create a dilemma in balancing the need to be competitive and efficient through applications of information technology in Asia. Goonasekera (1990) suggested that the introduction of modern communication technology to Third World societies has resulted in the sudden and rapid increase of "social density" or social relationships by bringing to the consciousness of individuals issues and personalities outside their immediate experiences. She reported "... (some societies) have resulted in the emergence of a heightened individual self-identity in order to understand and give meaning to new and unfamiliar situations created by the new media" (p.34). In our current study, in collectivist cultures (Turkey and Thailand) coming from an urban home is a significant determinant of successful use of computer technology. This is likely because urban areas in these collectivist cultures are more exposed to modern technologies and related information, thus holding more similar socioeconomic access to technology as the individualist cultures. In our data, urban home was not a significant predictor of successful use of technology in individualist cultures (United States, Canada, the Netherlands). We suggest that within country dispersion of advanced technology is greater in these individualist cultures.

Other factors that influence successful use of computer technology may include time pressure, infrequent terminal access, unfamiliarity of the communication protocol, and lack of command of English in non-English speaking countries. One of the most exciting findings of this study is that in collectivist cultures, familiarity with foreign languages significantly predicts the successful use of computer technology, while in individualist cultures this variable is not a predictor. Besides socioeconomic elements that lead to exposure to international culture and languages in collectivist cultures, English has been dominating the world of the Internet and computer programs. However, it is not the official or working language for most collectivist cultures around the world. Thus we find that in collectivist cultures the ability to speak multiple languages (especially English) predicts successful technology use. In individualist cultures, where English is widely spoken, multiple language facility is not a significant predictor of successful technology use.

Some seemingly simple variables created even more complex outcomes. For example, we found cultural differences in the way in which subjects expressed their comfort or discomfort with technology. Although there was a significant relationship between age and comfort in both culture types, subjects in individualist cultures expressed their comfort with technology in positive terms (e.g., I enjoy working with machines), while subjects in collectivist cultures expressed these feelings in terms of discomfort (e.g., Computers make me uncomfortable). The explanation for this difference may lie in different styles of managing uncertainty across cultures. Members of collectivist cultures depend more on group and context to reduce uncertainty, which is difficult or impossible while using computers to communicate with distant strangers. Therefore, they would likely express discomfort with the uncertainty created by the technology. Members of individualist cultures, on the other hand, communicate more personal and individual information to manage uncertainty. Since this type of information is more readily available via technology, and since members of individualist cultures have a lower need to avoid uncertainty (Hofstede, 1990), they are less likely to express their comfort in negative terms that reflect some of the uncertainty they feel unable to manage.

What is particularly striking about our overall findings is that the number of predictors for individualist cultures is greater than the number of predictors for the collectivist cultures (as indicated visually by the greater number of significant relationships indicated in Figure 2, versus Figure 3). One puzzling result of this study is that for collectivist cultures, none of the factors on attitudes about technology are significant predictors of successful use of technology, and there are fewer predictors for the factors than in individualist cultures. The reason may be

because most of the cross-cultural communication and technology management theories and research designs are the result of works by social scientists from western and individualist cultures. Future research could explore the perspectives and relevant predictors from a collectivist cultural perspective.

Implications and Contribution to HRD

This study gives us new insight into cross-cultural communication as it occurs in global virtual teams. This insight makes a unique contribution to the field of human resource development because it empirically examines an issue critical to the success of the human resource development profession in the new millennium -- application of technology in a global context. Our data sample, representing over 500 participants in six countries, is unique in its size and scope. We present data from individuals actually working in global virtual teams, and thus the findings can be readily interpreted for use in organization settings.

Human resource development professionals interested in facilitating successful global virtual teams need to be particularly sensitive to cultural communication differences as they will impact the ways in which team members communicate. Further, they need to be aware that there are different predictors of successful use of technology based on cultural background. Training may be needed to address culturally bound attitudes about technology in order to facilitate positive technology use. Further, the design and delivery of such training needs to be done in a culturally appropriate way, one that is sensitive to feelings of self-efficacy about using technology (Christoph, Schoenfeld, and Tansky, 1998). We recommend a cross-national training team, like our own research team, in order to best address the differences through a variety of cultural lenses, and to promote global understanding and tolerance.

This study is simply a starting point for research on global virtual teams and the cultural differences that underlie their efficacy. We encourage further research in this area, particularly by practitioners who have access to global virtual teams operating in current business practice.

Selected References (Complete references available upon request)

Association for Computing Machinery. (1996). Internet and web use in the U.S. *Communications of the ACM.*

Christoph, R.T., Schoenfeld, G.A., & Tansky, J.W. (1998). Overcoming barriers to training utilizing technology: The influence of self-efficacy factors on multimedia-based training receptiveness. *Human Resource Development Quarterly*, 9:25-38.

Gomez-Mejia, L.R., & Palich, L.E. (1997). Cultural diversity and the performance of multinational firms. *Journal of International Business Studies,* 28: 309-335.

Goonasekera, A. (1990). Communication, culture and the growth of the individual self in Third world societies. *Asian Journal of Communication* 1: 34-52.

Gudykunst, W.B. (1995). Anxiety/uncertainty management (AUM) theory: Current status. In Wiseman, R. (ed.), *Intercultural Communication Theory* (pp. 8-57). Thousand Oaks, CA: Sage.

Hall, E.T. (1976). *Beyond Culture*. New York: Doubleday.

Hoffman, D.L., Kalsbeek, W.D. & Novak, T.P. (1996). Internet and Web use in the U.S. Association for Computing Machinery. *Communications of the ACM,* 39: 36-46.

Hofstede, G. (1998). *Intercultural Communication.* intercultural.home.ml.org.

Hofstede, G. (1997). Cultural constraints in management theories. *Academy of Management Executive*, 7: 81-94.

Hofstede, G. (1991). *Cultures and Organizations: Software of the Mind.* Berkshire, England: McGraw-Hill.

Hofstede, G. (1980). *Culture's Consequences*. Beverly Hills, CA: Sage.

Low, L. (1996). Social and economic issues in an information society: A Southeast Asian perspective. *Asian Journal of Communication,* 6: 1-17

Walther, J.B. (1997). Group and interpersonal effects in international computer-mediated collaboration. *Human Communication Research*, 23: 342-369.

Watson, M.R., Miguel, M., Aycan, Z., & Jaeger, A. (1998) Stranger cultures: The role of culture and openness to technology in lean media communications. Presented at the annual meeting of the International Society for the Study of Work and Organizational Values (ISSWOV), July 1998.

Towards a Framework for Teaching and Learning in an Online Environment: A Review of the Literature

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The problem addressed in this paper is the lack of theory specifically related to teaching and learning in an online environment. Through a literature review and analysis, two significant teaching and learning theoretical paradigms are presented. It was concluded that the integration of these two approaches will allow for the emergence of new theories that focus on teaching and learning in on online environment.

Keywords: Online Teaching, Behaviorism, Constructivism

Human Resource Development (HRD) curriculums in academic institutions are currently being impacted by two major factors: the Internet and the growing demand for courses via the Internet. These factors have come about due to the societal move from an industrial age to an information age. This shift has caused adults to use the Internet at a continuous pace for professional, personal, and educational purposes (Eastmond, 1998). With the advances of the technology and software surrounding the Internet, the conversion of courses from traditional face-to-face into Web-based courses has become easier and is occurring more systematically in education (Jiang & Ting, 1998). HRD faculty in higher education have also moved toward the use of the Internet to deliver training and development, organizational development, and career development courses online.

Although teaching via the Internet is growing at a steady pace, the current literature on Web-based courses focuses primarily on the technical processes of design or the differences in outcomes for learners who participated in face-to-face instruction versus those who participated in a course via the Internet. With the expansion of Web-based technology in all areas of HRD, it is evident that it is time for research in Web-based teaching and learning to expand farther than the popular comparison studies of learning outputs (Russell, 1997; Johnson, Aragon, Palma-Rivas, Shaik, & Bilsbury, 1999)..

Although research in the aforementioned area is necessary, there should also be research dealing with the learning theories that conceptualize teaching and learning in an online environment. There must be attempts at theoretical explanations for Web-based or online teaching and learning in order for professionals that teach via the Internet to make teaching and learning decisions with confidence. Until recently these theoretical considerations were not addressed. Research in these areas will give HRD faculty their purpose for teaching in an online environment, help to categorize learners who take online courses; define the role of the teacher in an online environment, and define appropriate methods that can be used in an online teaching and learning environment.

The purpose of this literature review was to determine the theoretical framework for teaching and learning in an online environment. Because theory suggests why events occur in the manner that they do, it is important to begin to link teaching and learning online with current teaching and learning theory. These theories provide a direction to research and practice; hence, it is important for HRD faculty to have a link that will allow them to predict aspects of teaching and learning online. Therefore, the following questions should be asked about online research as educators move into the new century. This review of the literature attempts to seek answer these questions.

- Currently, what are the theories and principles that provide HRD faculty with the most effective methods and strategies of teaching and learning in an online environment?
- Do current theories of teaching and learning supply HRD faculty with a framework of which to develop online teaching and learning activities?

This paper will review the literature surrounding the theory of teaching and learning in an online environment. The purpose of this exploration is to determine the basis of this construct and how it can implicate the instructional design, teaching, and learning process in online educational programs. In order to analyze this

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application of teaching and learning, bodies of literature from distance learning, teaching and learning theory, educational technology, and instructional technology were reviewed within the fields of HRD, adult education, and industrial/organizational psychology.

Review of the Literature

Before any research in any area can take place, a review of the literature must be completed. The review of the literature can summarize previous work on the topic and offer suggestions for future research (Merriam & Simpson, 1995). The original purpose of this literature review was not to present results or findings on teaching and learning in an online environment. The original purpose was the same as any literature review as described by Merriam and Simpson (1995). It was completed as a conceptual foundation to a study focusing on instructional design and online teaching and learning. This literature review was to: (1) provide a foundation for building knowledge in online teaching and learning theory; (2) show how the researchers current study on instructional design advances what is already known about online teaching and learning; (3) help conceptualize the study; (4) help provide and define a framework for the methodology for the study; and (5) offer a collect point of reference for interpreting the data that will be collected from the researchers study on instructional design and online teaching and learning. However, as this researcher reviewed the literature on theories of teaching and learning in an online environment, it became apparent, that there were several different views on what current learning theories best fit teaching and learning online.

These differences reiterated the need for theoretical apporaches as a basis for instructional practice in an online environment. Numerous decisions concerning policy, finances, and education are being made based on online teaching and learning. Some of these decisions are being made based on experience with traditional face-to-face courses. These decisions are atheoretical, yet they affect thousands of potential students each year. It is this researcher's belief that just as in converting a traditional face-to-face course to a Web-based course requires time and effort, the theories and principles that guide practice in traditional face-to-face instruction can not be directly converted to online instruction.

A discussion of the theory surrounding teaching and learning in an online environment is important because it directly affects the practice of the field. What follows is a synthesis of the major issues and differences found in the literature on teaching and learning in an online environment.

Theory Wars in Online Teaching and Learning: Behaviorism versus Constructivism

A major debate has surfaced about the basis of teaching and learning in an online environment. Of the current theories that support online teaching and learning, behaviorism has historically had the greatest impact. However, more courses are being designed online with the cognitive view in mind. Hence, there are two ends of a spectrum relative to teaching and learning online. That is, some researchers view the behaviorist principles as the most suitable for online learning, while others view the constructivist principles, which has its basis in cognition, as the most appropriate.

Historically, behaviorism methods have been used where students are presented information which they repeat back to the teacher. These methods have been predominant in training and development (Peterson & Cooper, 1999). Behaviorists view psychology in terms of resulting behaviors which can be modified by consequences such as rewards or punishments. Behaviorism was used as the basis for designing early audio-visual materials and was the impetus for many related teaching strategies such as teaching machines and programmed texts. Thorndike's connectionism, Pavlov's classical conditioning, and Skinner's operant conditioning were ideas used to give direction to the early researchers who examined the impact of technology on teaching and learning (Thompson, Simonson, & Hargrave, 1992). Although some researchers believe that there is much about behaviorism that is unattractive to learning, a great deal is owed to those theorists who advocated behaviorist principles in teaching using technology.

The current trend in teaching and learning, tends to be constructivism which is based in cognitive psychology. With this model, students are viewed as active participants and processors of information. Constructivism, which has as its synonyms active learning, adult learning, and self-directed learning, is changing the way educators think about the teaching and learning. Constructivists believe that learners approach a learning task with a set of personal beliefs, motivations, and conceptions about the subject area and the knowledge to be taught (Holmes &

Leitzel, 1993). Kember & Murphy (1990) site that when learners are taught, they construct meanings from the material by relating it to their existing conceptions, frameworks, and knowledge. The implications of constructivism on teaching and learning in an online environment require that teaching methods be selected and implemented that draw on the participant's experience and fosters participation from the participants.

Behaviorism and constructivism have common grounds such as the use of feedback and the importance of assessment. However in teaching and learning situations, the behaviorist wants to take the learner and produce desired behaviors by controlling the environment, whereas the constructivist wants to see how learning occurs. Both these views are important for online teaching and learning. Hence, both these methods are critical to provide a rich teaching and learning climate. The nature of the Internet provides a perfect vehicle to integrate behaviorist and constructivist theories in order to understand the totality of teaching and learning in an online environment.

Behaviorism and Constructivism: A Teaching/Learning Match Made Online

Some researchers would consider it improper to integrate behaviorism and constructivism into a single approach for teaching and learning in an online environment. However, after reviewing the literature on this subject, this researcher takes the risk to conclude that new theories and principles of teaching and learning should be developed for use in an online environment. What are these new theories and how will they affect current practice? Based on the "wars" from the literature, it is evident that new theories and principles may begin to emerge which focus on teaching and learning in an online environment. The figure below shows an equation that should be solved for online teaching and learning.

A New Equation in Online Teaching and Learning

The use of technology as a delivery medium has fostered the integration of current teaching and learning theories; therefore, as researchers it is important to examine the current theoretical literature as it relates to online instruction and learning. In addition, this researcher believes that the philosophies which undergird the teaching and training of adults should be examined as technology may force educators who deliver online courses to merge toward one consistent philosophy of "teaching" online.

Implications for HRD Theory and Practice

"A literature review functions as a means of conceptualizing, justifying, implementing, and interpreting a research investigation" (Merriam & Simpson, 1995 p. 33). Therefore, this literature review shows that it is necessary that additional research be undertaken in determining theoretical bases for online teaching and learning. HRD scholars and practitioners who teach in an online environment must be aware of the possible issues that surround teaching and learning in this medium. Therefore, the conclusions of this literature review lie in the possible questions that can prompt future research in online teaching and learning.

Research Implications.

The major implication for research on this theoretical match is the development of new research areas and the emergence of theories, principles, and applications that are directly related to teaching and learning in an online environment. These implications for research in the area of online teaching and learning are endless. The most promising areas of research surrounding online learning are the design and development of online learning courses, the evaluation of the instructional design and development process, technological impacts on teaching and learning, online 'teaching" competencies, theoretical bases for teaching and learning in an online environment, the impact of online educational programs, and organizational and institutional issues concerning online educational programming. These are just a few areas that will require investigation from researchers as the field begins the new century. Examination of these areas will advance the academic field of HRD by providing new insights about teaching and learning, filling practical and theoretical voids, defining relationships to existing theory, and contribute to the improvement of online teaching and learning.

Practical Implications

The implications for HRD practice lie predominately with instructional design and teaching. Examining a theoretical base for online learning will give those professionals in HRD a sound basis for assessing, designing, developing, implementing, and evaluating online learning materials, courses, and programs. Online teaching and learning strategies and methodologies can be applied to practice when theories and principles are developed for this environment. HRD organizations and practitioners will be able to apply these principles to the development of online programs which can improve practice in all areas of HRD and adult education.

Summary

The Internet has changed the way educators view teaching and learning. The purpose of this literature review was to determine a theoretical framework for teaching and learning in an online environment. What the literature suggests is that an integration of behaviorist principles and constructivist principles may be best suited for online teaching and learning. Although historically the theory which undergirds these principles have not been combined, it is this researchers view that a combination of these principles will create new principles for teaching and learning and will mold online methods and strategies. Hence, a key question for future research has become: will technology force new teaching and learning theories, principles, and models to emerge?

References

Eastmond, D. (1998). Adult learners and internet-based distance education. In B. Cahoon (Ed.), Adult learning and the internet (pp. 33 – 41). San Francisco: Jossey Bass.

Holmes, G. & Leitzel, T. "Evaluating Learning through a Constructivist Paradigm. Performance and Instruction (September 1993), pp.28-30.

Jiang, M. and Ting, E. (1998). Course design, instruction, and students' online behaviors: A study of instructional variables and students perceptions of online learning. Paper presented at the annual meeting of the American Educational Research Association, San Diego, CA.

Johnson, S., Aragon, S., Palma-Rivas, N., Shaik, N. & Bilsbury, N. (1999). Comparative analysis of online vs. face-to-face instruction. In P. Kuchinke (Ed.), 1999 Conference Proceedings for Academy of Human Resource Development, Vol. 1 (pp. 68-76). Baton Rouge: AHRD.

Kember, D. & Murhpy, D. (1990). "Alternative new directions for instructional design. Educational Technology, pp. 28-33.

Merriam, S. & Simpson, E. (1995). A guide to research for educators and trainers of adults. Malabar, FL: Krieger Publishing.

Peterson, S. & Cooper, M. (1999). Themes of adult learning in human resource development. Proceedings of the 40th Annual Adult Education Research Conference, 258-263.

Russell, T. L. (1997). The "no significant difference" phenomenon. <http://www2.ncsu.edu/oit/nsdsplit.htm>.

Thompson, A., Simonson, M. Hargrave, C. (1992). Educational technology: A review of the research. Washington, DC: Association for Educational Communication and Technology.

Learning Human Resource Development through Electronic Discussion

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The purpose of this study was to explore the use of electronic discussion as a teaching and learning strategy for graduate students within a human resource development graduate program. Over 450 student contributions to electronic discussions were analyzed to extrapolate learning processes, group processes and faculty role. Results indicate that learning progressed to a high analytical level during electronic discussion and that group process development facilitated learning as well.

Keywords: Computer Mediated Instruction, Technology, Learning Processes

The delivery of training through on-line courses, web-based instruction, reflector groups, and web-based conferencing is exploding. Yet, research is only beginning to examine the impact this technology has on learning. Previous research has examined instructional design of web-based courses (Braden, 1996), differences between face-to-face teaching and on-line teaching (Russell, 1997), and learning style change in a technology-rich environment (Cohen, 1997). A major question yet to be explored in-depth by the field of human resource development (HRD) is: *"What impact do new technological teaching strategies have on the learning of HRD practitioners?"*

Often the terms teaching and learning are used interchangeably in every day conversations of faculty and students. When it comes to understanding computer-medicated environments, most often the concept of teaching is explored and the unstated assumption is that good teaching will produce high quality learning. However, following a study of 127 courses housed on the world wide web, Boshier, et. al. (1997) indicate that, "While the web holds considerable potential for learner interaction, few courses use much of its interactive capability. Most courses surveyed offer no possibility of collaborative learning. The chief difficulty was conceptual, not technological. It appears that many, if not most courses, were designed by 'instructional designers' obsessed with objectives, assessment of students and arranging things in a hierarchical order . . . the author has uncritically and, in many cases, unwittingly and naively endorsed a transmission model of learning" (p. 340). Thus, as indicated in this study the major focus of faculty using computer-mediated environments has often been on teaching and course design.

Very recently, however, the concept of learning in computer mediated environments has begun to be investigated. For example, Milton, Davis & Watkins (1999) looked at the interactions that occurred within small groups in an asynchronous web-based distance learning environment and found that virtual learning communities developed when there was a fusion of the learning processes and group dynamics. Rheingold (1994) indicated that the potential anonymity of virtual communities contributes to learners feeling that "virtual communities treat them as they always wanted to be treated – as thinkers and transmitters of ideas and feeling beings" (p. 26). Chester and Gwynne (1998) found that two-thirds of the students in an on-line course rated their participation in the subject matter as greater than in a face-to-face course. Holt (1998) analyzed student participation in a national issues forum conducted on the internet for the purpose of studying its effectiveness and analyzing facilitation methods. Holt (1998) described how a multi-stage deliberation process developed that was "largely consistent with the theoretical literature about critical and reflective thinking" (pg. 46). Additionally, this study identified that the discourse developed differently in discussions conducted on the internet versus those conducted by electronic mail. Finally, Milton and Wilson (1999) indicated that "the analysis of these small groups (in a computer-mediated environment) has taught us that the additional dimensions of time and space supported through collaborative technology increase the complexity of the learning and the interdependence of the processes and people involved" (pg. 7). These previous studies indicate a great need for additional information describing the impact of technology on learning processes, learning effectiveness and learning outcomes. The intent of this study was to

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begin to fill this gap by analyzing learning processes, group processes and teaching processes in courses using electronic discussion.

Conceptual Framework

Constructivist learning theory provided the overall conceptual framework for this study. This framework was selected because, as Merriam and Caffarella (1999) indicate, "two adult education practice arenas in particular where constructivist and situated cognition concepts are having an impact are in continuing professional education and human resource development" (p. 263).

Constructivist learning theory holds that "learners actively construct and reconstruct knowledge out of their experiences in the world" (Kafai and Resnik, 1996, p. 3). Knowledge construction takes place when learners actively construct knowledge through intellectual engagement and investment in personally meaningful tasks. Constructivists believe that individuals learn through their experience and that meaning is rooted in that experience. The key to learning, in a constructivist framework, is for the learner to find multiple ways to link new information to previous experience. Lambert et al. (1995) refer to constructivism as the epistemological processes of knowing and coming to know (p. 17). Within a constructivist framework learners create their own knowledge by how they put their worlds together. In other words, constructivists focus on the connections that the learner is making between ideas. Novak (1998) believes that learning occurs through a process of assimilating concepts into the cognitive structures by either subsuming concepts under each other, by progressively differentiating concepts from each other or by reconciling the similarities between concepts. The crucial element is that the learner actively creates a knowledge base through the linkages and the experiences. "The design task, therefore, is one of providing a rich context within which meaning can be negotiated and ways of understanding can emerge and evolve" (Hannafin, et. al, 1997, p. 109). For this study, graduate courses were designed and implemented from a constructivist framework. Electronic discussion was viewed as a teaching strategy to facilitate constructivist learning.

Research Questions

The purpose of this study was to analyze one component of technological teaching strategies, electronic discussion groups, with an adult student population. The following research questions were advanced to guide this inquiry:

1. In an electronic discussion, what learning processes do adult learners utilize?
2. In an electronic discussion, how do group processes develop?
3. How does the faculty role change when using electronic discussion?

Methodology

Electronic discussion was used as a teaching methodology in four HRD graduate courses offered within a master's degree program in adult education and HRD at a major Midwestern university. Course activities were designed to offer the learner an opportunity to develop knowledge and beliefs related to course content, integrate experiences, and ultimately reflect on and assess their own level of learning. Electronic discussions were used in each course to analyze case studies, discuss course readings, and reflect on learning achieved during the course. Learners were expected to participate in assigned course activities, as well as, in conversations with other course participants. Since the intent of this study was to explore the impact of electronic discussion on learning, a convenience sample of courses using electronic discussion was included in this study. All courses were taught by the same instructor. Two courses employed electronic discussion using electronic mail and two courses employed electronic discussion over the internet.

A total of 52 individuals participated in the electronic discussions analyzed for the purpose of this study; 76% were female and 24 % were male. The majority of students enrolled in the courses reviewed in this study had used some form of electronic discussion previously. Participants ranged in age from 25-55 years old.

Following the completion of the four courses, over 450 adult student discussion contributions were analyzed using a constant comparative method of analysis (Glaser & Strauss, 1973). Each individual learner contribution was treated as a separate unique piece of data. All learner contributions were reviewed, compared and analyzed until category themes could be extracted. Data from all the contributions were then coded into a qualitative data analysis software program using the coding scheme developed. In addition to data coding, a system of matrices was designed to analyze each research question under study. One matrix depicted data descriptive of learning processes, one matrix depicted data descriptive of group processes, and one matrix depicted data demonstrating faculty role. From these matrices the researcher was able to see patterns, themes, and processes that developed during the electronic discussions. Quality control was maintained by a second qualitative researcher reviewing the dependability and confirmability (Lincoln & Guba, 1985) of study data, methods and findings.

Findings

The findings from this study will be presented in three areas:

1. learning processes
2. group process
3. faculty role in electronic discussions. (see Figure 1).

Learning Processes Data indicate that adult students, in these courses, used four different learning processes during an electronic discussion. These processes were labeled engaging, developing conceptual relationships, drawing conclusions, and reflecting and self-evaluating.

First, an engagement process developed where the adult learner used multiple and varied strategies to gain comfort with the technology. During this engagement process it was common to receive messages that stated, "I have never done this before but here goes." Adult learners not only engaged with the technology in this phase, but they needed to "get over the technology hump." They would send messages multiple times to make sure that they were received, they would switch Internet providers and change services as they discovered how the technology worked. They would initially engage with the technology to chat, plan snacks and meals for class, and clarify course assignments.

Second, the adult learners began developing conceptual relationships with the course content under study by: a. linking and differentiating concepts; b. engaging in dialogue linked to their own and their colleagues experiences, and, c. evaluating colleague comments. Each of these three processes were seen within each course, in the same sequence, irrespective of the course being conducted on the Internet or by electronic mail.

Linking. Learners initially used the electronic discussion to link and differentiate concepts. This process was most often initiated by a leaner who linked concepts from two-three course readings. Once this linking happened a different learner responded and further clarified or expanded on the connected ideas. For example, a student enrolled in a continuing professional education course stated:

Schon's work on reflecting in action, Mezirow's work on transformation theory and Brookfield's work involving critical thinking combine into an interesting look at how we might get outside our own minds and see our thoughts and feelings as magnificent contrivances of the world rather than as the only way that things can be. Each work deals with bewilderment and intellectual vertigo but differ in where they place emphasis of work within the topsy-turvery world of our brains.

Following this a second learner stated:

> I feel compelled to reply to J. She did such a splendid job of discussion of Schon/Mezirow/Brookfield. Now for a little perspective from my view of the reading.
>
> Dialogue. *Next the learners ability to create a dialogue that linked to their own experience developed. In this phase the learners seemed to move away from the focus on their readings and move to a discussion of their own experiences as related to their colleagues experiences. For example in this phase learners stated:*

So rather than questioning the role of CPE in fostering these concepts, I question the role of the organizations sending their employees to the CPE programs. Do some of your corporations have a defined policy or process whereby employees can propose changes based on new learning from CPE? In my experience of a hospital setting, it seems to me that most changes come from the top and only the free and easy suggestions from the lower ranks are easy to implement.

During this dialogue phase, learners attempted to understand and create meaning. As such, learners often made the following type of comment.

Ive just printed and re-read everyone's comment in the last week. Besides helping me better understand what Ive read, Ive really thought about everyones examples.

This leaner then went on to link colleague comments together, provide a summary of the discussion to date and to add her own new comments that moved the dialogue even further.

Evaluating. It was interesting to note that in each group analyzed for this study, there was a point where one learner took the risk to disagree or challenge the thinking of a student colleague. Sometimes these challenges were subtle such as, "in thinking about Hs comments I am not sure I agree with her full assessment, my ideas take me in a different direction." At other times the challenge was more direct. For example, in a leadership course the students were discussing the movie Norma Rae. One student characterized the movie's main character as a transactional leader. Another student took exception with this and wrote a detailed analysis of transactional versus transformational leadership and challenged the first interpretation as not linked to the course materials or content. This challenge spurred the rest of the group to analyze leadership theories in much more depth. Once that challenge happened, the group moved to yet another level of learning; drawing conclusions.

In the third level of learning, adult students used knowledge to draw conclusions and make decisions. For example, students were discussing the importance training within a business environment. They had discussed both the role of management and the role of training. One learner used this discussion to frame a work-related decision as follows:

More and more I believe HRD people must be very business focused, not only in their approach to training but how they manage themselves and their departments. . . The decision to use CBLs as the training tool for new employees may not be the best solution but there are so many aspects to consider. Our company has over 100 employees. Their orientation, training, etc. is solely in the hands of managers. I would score huge brownie points if I delivered a CD ROM with an overview of the company and executive welcome, but I wont because I do not believe that training is the root cause for 50% turnover.

Finally, some groups reached a fourth level of learning that included a reflection and self-evaluation process. In these groups, learners would share changes in their own thinking, changes in their world views and meta-cognitive processes they used in learning. For example consider the student who indicated:

Why is it important to be situated in an authentic activity? I will give you an example via a problem I solved while I read the articles on situated cognition. I believe that I have finally figured out - "Why do the professors always want us to include in our papers the implications of what it is we are studying or alleging through our analysis?" Well, obvious as the answer may seem to you - I have always been bothered by it. First of all, since I am currently not an educator I often could not think of any implications for the field of education. . . . Now, I realize that because I am not situated in an education field I have completely backward perception of these exercises. Also the word implication got in the way for me. My business background led me to want to think about situations as having to have a cause and effect. When I could not say this could cause that I did not have an implications worth writing down. Well, I have been transformed. I dont believe the task of compiling implications is a cause/effect assignment anymore . . . I consider the thinking exercise of realizing implications as a way to hone my tools as a student. Therefore I can let my thinking lead me to the implications and then let the implications lead me to future study. So not I just dont study about situated cognition I try to live in the idea of it.

Group Processes Data indicated that the group processes seemed to be similar to group processes that develop in face-to-face instruction. Group atmospheres were cordial, communication patterns seemed to be linked and nested, participation patterns included all learners, and group norms seemed to develop. In one group, for example, the discussion norm seemed to be that before entering the discussion on a particular topic, the learner first needed to develop their own written statement of understanding before it was acceptable to comment on a colleague's view. Additionally, level of participation in an electronic discussion was a group norm that developed. In some groups the level of participation was extremely high and the group seemed to push each other for more and more contact. In other groups a moderate level of participation developed and the group norm was not as demanding. Groups also developed ways to tease, have fun and "joke around" on line. These findings are similar to that of Milton, Davis and Watkins (1999) who in their study of virtual learning communities, noted that "each group engaged in their own set of behaviors and established a unique identity that was largely the result of the group dynamics. . . The two issues that seemed to be critical but that detracted from the performance of the groups were agreement of an acceptable level of participation and engagement with the group" (p. 5).

Faculty Role Electronic discussion fostered a change in the faculty role. The faculty role tended to be one of electronically summarizing and linking comments made by learners rather than presenting or sharing information. This summarization and linking process appeared to be most helpful to the groups once they had engaged in dialogue about their own experiences. This study supports Holt's (1998) findings that indicated "facilitating on-line learning involved many responsibilities: creating the environment, guiding the process, providing points of departure, moderating the process, managing the content and creating the community" (p. 48). These changes place faculty members in a guiding and facilitation role, rather than a knowledge transmission role. One interesting finding of this study was that if the faculty member entered the discussion too early, then the learners talked to the faculty member as the authority figure. However, if the faculty member waited and entered the discussion after colleague relationships had been established between learners, then the faculty member could enter the discussion and the group would treat them as a group member rather than as the authority figure.

Implications for Practice and Research

This study has implications for the practice of HRD, as well as, further research in the field. First, HRD practitioners will benefit from a greater understanding of how technology facilitates not only the teaching process, but the learning process as well. This deeper understanding of the impact of technology on learning, can lead to more effective use of technology in teaching.

It was evident in this study that the learners moved through learning processes of engagement, developing conceptual relationships, drawing conclusions, and reflection and self-evaluation. The electronic discussion format fostered the learners taking a more analytical and reflective approach to their own learning. A number of factors could have contributed to this high level of analysis and synthesis in learning. First, a constructivist approach was used in designing the discussion format and group activities. Learners were asked to focus on connections with content and analysis of experiences. Second, the technology provided the learner the ability to read colleagues' comments, print those comments, go back to course materials and integrate these materials with their colleagues comments, think about what it meant and then, ultimately frame their response. Learners who participated in electronic discussions felt that they used a "more thoughtful" process in framing responses. They also indicated, "You know, there is a record of the things we say, so I think we are accountable in a different way for our ideas than we are in a classroom discussion." A major teaching/learning issue raised by this study, is what course content/activities are best suited for electronic discussion and which are best suited for classroom discussion. It appears that trainers and adult educators will need to address this issue in their consideration of the use of discussion formats within courses. As Boshier et. al. indicate, "From an adult education perspective, it is not acceptable to use the web to emulate the worst of face-to-face courses where power relations are unproblematised and learners constructed as passive recipients of information" (p. 347).

Second, this study has implications for further research. The author considers this to be an initial, preliminary exploration, and the field would benefit from its replication and expansion. Additionally, future research is needed to understand learning processes that develop in computer-mediated environments. For example, the field would benefit from understanding more about the connections between specific technologies,

instructional design, learning process, context, and facilitators. What impact do each of these have on the learner in a technology enhanced environment? Holt (1998) concurs and indicated that 'further research is needed to investigate the structuring and sequencing of electronic forums, strategies for combining face-to-face and electronic experiences, techniques for effective moderation of on-line conferences, and methods for modeling critical thinking" (p. 48).

Conclusions

In conclusion, this study has begun to identify the impact that electronic discussion has on the learning processes, teaching processes, and group processes within an HRD graduate program. It is apparent that these processes are intricately connected and that each needs to be fully analyzed and understood in order to be employed effectively. As adult educators, we need to move beyond using technology because it is available, exciting, new and unique. We need to ask ourselves, "If I use this technology will it have an impact on learning and how will that impact occur?" As Chester and Gwynne (1998) indicate, "We can not assume that the skills and pedagogy of face-to-face teaching will be appropriate in cyberspace. We have to be open to change and open to the lessons, both in their delights and their dangers, that teaching on-line can offer" (pg. 9).

References

Boshier, R., Mohapi, M., Moulton, G., Qayyum, A., Sadownik, L., & Wilson, M. (1997). Best and worst dressed web courses: Strutting into the 21st century in comfort and style. *Distance Education*, 18, 2, 327-348.

Braden, R. (1996). The case for linear instructional design and development: A commentary on models, challenges and myths. *Educational Technology*, March-April, 5-23.

Cohen, V. (1997). Learning styles in a technology-rich environment. *Journal of Research on Computing in Education*, 29, 4, 338-349.

Glaser, B. G. & Strauss, A. L. (1973). *The discovery of grounded theory: Strategies for qualitative research*. Chicago: Aldine Publishing.

Hannafin, M., Hannafin, K., Land, S. & Oliver, K. (1997). Grounded practice and the design of constructivist learning environments. *ETR&D*, 45 3, 101-117.

Holt, M., Kleiber, P., Swenson, J., Rees, R. F., & Milton, J. (1998). Facilitating group learning on the internet. In B. Cahoon (Ed.), *Adult Learning and the Internet: New Directions for Adult and Continuing Education*, 78, (43-51) San Francisco: Jossey-Bass, Inc.

Kafai, Y, .& Resnik, M. (1996). *Constructionism in practice: Designing, thinking, and learning in a digital world.* Mahwah, NJ: Lawrence Erlbaum Associations.

Lambert, L., et al. (1995). *The constructivist leader.* New York: Teachers College Press.

Lincoln, Y. & Guba, E. (1985). *Naturalistic inquiry*. Newbury Park: Sage Publications.

Novak, J. (1998). *Learning, creating and using knowledge: Concept maps as tools to understand and facilitate the process in schools and corporations.* New Jersey: Lawrence Erlbaum Assoc.

Merriam, S. & Caffarella, R. (1999). *Learning in adulthood*. San Francisco: Jossey-Bass, Inc.

Milton, J., Davis, M., & Watkins, K. (1999). *Virtual learning communities: Creating meaning through dialogue and inquiry in cyberspace*. In K. P. Kuchinke (Ed.), Proceedings of the 1999 Academy of Human Resource Development Conference (pp. 1165-1173). Baton Rouge, LA.

Milton, J., Wilson, J., & McCall, M. (1999, May). *Through the looking glass: Learning through and in spite of Technology. A qualitative analysis of action science case work on the web.* Presented at the Adult Education Research Conference, University of Northern Illinois, Dekalb: IL.

Rheingold, H. (1994*). The virtual community: Finding connections in a computerized world.* London: Secker & Warburg.

Russell, T.L. (1997). The "no significant difference" phenomenon. http://www2.ncsu.edu/oit/nsdsplit.htm

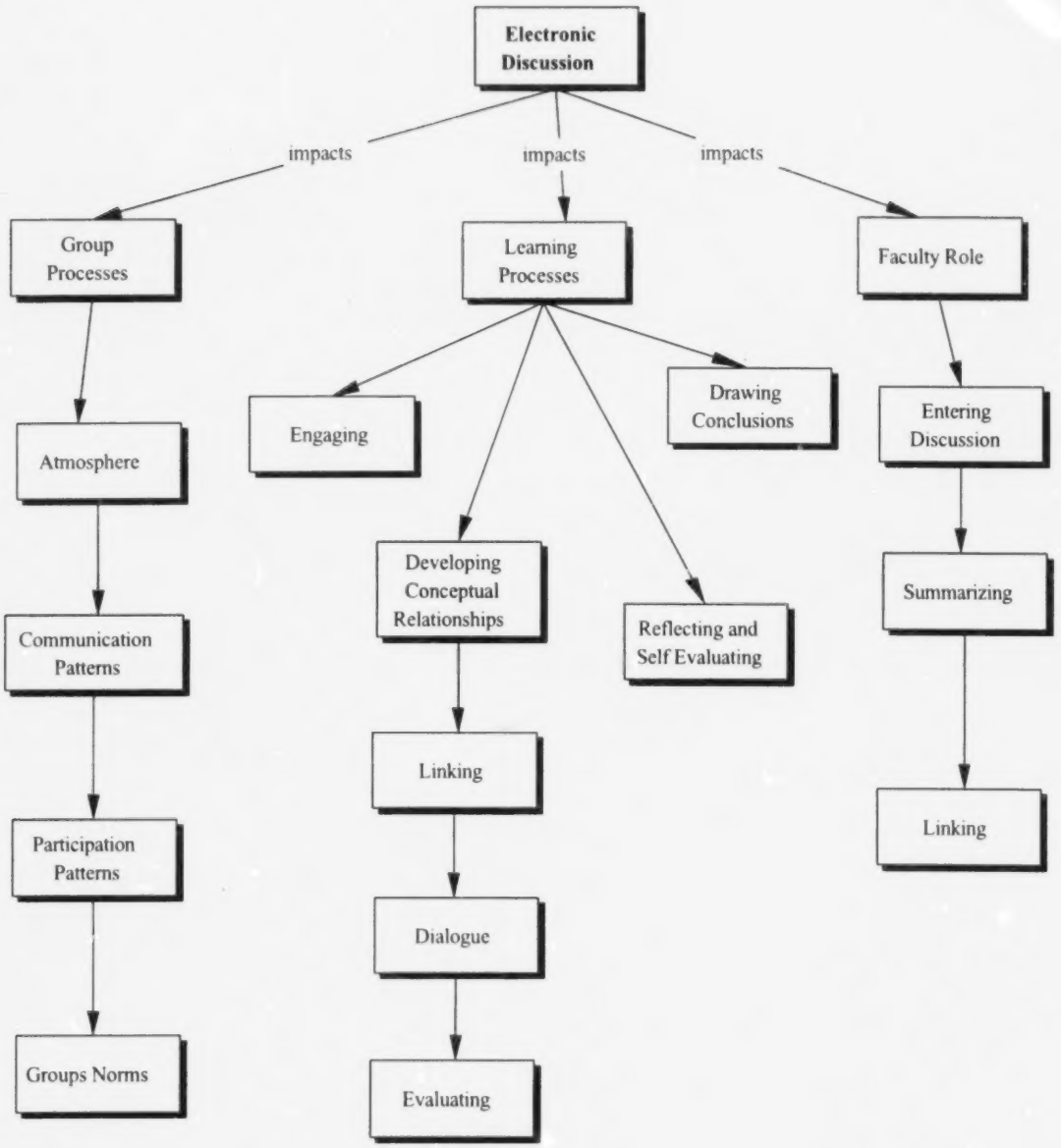

Figure 1: Impact of Electronic Discussion on Learning Processes, Group Processes and Faculty Role

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